ORIGINAL

IN THE UNITED STATES DISTRICT COURT
FOR THE MIDDLE DISTRICT OF PENNSYLVANIA

JACK MARRONE, husband, KAREN MARRONE, wife, both individually and in their capacity as parents and guardians for VIDA MARRONE, a minor, and MATTHEW ADAM MARRONE,	:	Civil Action No.: 1:CV-01-0773
Plaintiffs	:	
vs.	:	(U.S. District Judge Yvette Kane)
ALLSTATE INSURANCE COMPANY, LINDA M. EDLEMAN, FRED SCHAFER, MT. GRETNA REALTY, and HOUSE MASTERS	:	**JURY TRIAL DEMANDED**

STATE OF PENNSYLVANIA)
)ss
COUNTY OF Berks)

FILED
HARRISBURG, PA
NOV 25 2002
MARY E. D'ANDREA, CLERK
Per

AFFIDAVIT OF ROBERT PFROMM, CIH

BEFORE ME, the undersigned authority, a Notary Public in and for the County and State aforesaid, personally appeared Robert Pfromm, CIH, known to me (or satisfactorily proven) to be the person whose name is subscribed, and having been duly sworn, deposes and states under oath as follows:

1. I am above the age of 18, of sound mind and capable of executing this Affidavit.

2. My curriculum vitae establishing my competancy as an expert is attached as exhibit 1.

3. The facts and opinions contained in my reports and supporting documentation attached to my reports are based on my personal knowledge and experience and are attached as

exhibit 2.

4. Attachment 7 to the report of Tom Moore, which were photographs of the Marrone home as it was at the time of the inspection Mr. Moore conducted on August 12, 2002, were attached to Mr. Moore's report as exhibit 4. I referenced those photographs in my report of September 12, 2002.

11-15-02
DATE

Robert A. Pfromm
Robert Pfromm

SWORN TO and SUBSCRIBED TO

before me this 15th day

of November, 2002.

Lawrence E. Ramberger
(Notary)

Notarial Seal
Lawrence E. Ramberger, Notary Public
Bernville Boro, Berks County
My Commission Expires Mar. 15, 2006
Member, Pennsylvania Association Of Notaries

ROBERT A. PFROMM, CIH

SENIOR TECHNICAL ADVISOR

PROFESSIONAL EXPERIENCE

ADVANCED APPLIED SCIENCES, INC. **March 1999 to Present**

SENIOR TECHNICAL ADVISOR

Mr. Pfromm presently serves as the Senior Technical Advisor for Advanced Applied Sciences, Inc. from which he is primarily responsible for providing technical oversight and supervision in support of our indoor air quality, industrial hygiene, environmental, health and safety projects. Mr. Pfromm also provides training in the areas of indoor air quality and bioremediation.

For more than eighteen years, Mr. Pfromm has worked as an occupational safety and health professional. The American Board of Industrial Hygiene (ABIH) has certified him in the Chemical Aspects of industrial hygiene since 1988. In 1999 Mr. Pfromm tested for and received from the ABIH, the rare sub-specialty certification in Indoor Environmental Quality. In the field of occupational safety and health he has personally performed hundreds of surveys, investigations and assessments over the broad range of that discipline. His experiences have additionally been enhanced by many projects in the province of the environmental sciences; ranging from analyses of environmental air, water and soil samples and laboratory management, to phase 1 auditing, safety and health training, indoor air quality surveys and project management on biological remediation, lead abatement and asbestos remediation. He has had extensive experience interfacing with engineering, architectural, medical and legal professionals, as well as union and employee groups such as teachers unions as they were integral to and associated with these projects.

Mr. Pfromm has worked closely with company & corporate managers and professionals. At the same time he has had to communicate with and establish a working relationship with supervisors, staff, technical personnel, laborers, students and their parents. As a technical trainer, he has taught engineers, chemists, teachers, educational administrators and maintenance and custodial personnel in a variety of occupational and environmental subjects, including Bloodborne Pathogens, Right to Know, Asbestos Awareness and Indoor Environmental Quality Awareness. To function in these capacities, he has had to develop and maintain considerable communication and personnel skills.

ROBERT A. PFROMM, CIH

SENIOR TECHNICAL ADVISOR

AMERICAN WESTECH, INC. **March 1999 to Present**

DIRECTOR, INDUSTRIAL HYGIENE SERVICES

Advanced Applied Sciences, Inc. provides consulting services to American Westech, Inc. as a subcontractor. Mr. Pfromm manages the account and is responsible for achieving and maintaining certification of the laboratory by the American Industrial Hygiene Association (AIHA) and ensuring that the level of training, quality control and performance of the laboratory facility, its operation, and its personnel meet or exceed all applicable AIHA requirements.

Mr. Pfromm is directly responsible for the development and implementation of a sound Quality Assurance (QA) and Quality Control (QC) Program pertinent to the industrial hygiene department of American Westech, Inc.

INX CORPORATION **July 1998 to March 1999**

DIRECTOR, INDOOR AIR QUALITY SERVICES/

CERTIFIED INDUSTRIAL HYGIENIST

Mr. Pfromm marketed, planned, executed, and reported Indoor Air Quality services to a wide range of clients from industry to schools and homeowners. He was also responsible for planning and managing remediation projects based on survey results.

KARL & ASSOCIATES **October 1996 to July 1998**

SENIOR INDUSTRIAL HYGIENIST

Mr. Pfromm was responsible for marketing, planning, implementation, and reporting of a variety of industrial hygiene and indoor air quality services for a broad range of clientele, from factories to school districts. In addition, Mr. Pfromm administered and performed an extensive range of training programs for employees of client school districts to meet state requirements. Mr. Pfromm also administered an environmental services program for a consortium of school districts in New Jersey.

ROBERT A. PFROMM, CIH

SENIOR TECHNICAL ADVISOR

INDEPENDENT CONSULTING — **January 1996 to October 1996**

CERTIFIED INDUSTRIAL HYGIENIST

Mr. Pfromm provided a variety of industrial hygiene and indoor air quality services to a broad range of clientele, from consulting engineers to school districts. In addition, Mr. Pfromm performed an extensive range of training programs.

ANALYTICAL HYDROLOGY ASSOCIATES, LTD. (AHA) — **January 1990 to July 1992**

ANALYTICAL LABORATORIES OF SKELLY AND LOY, INC. (ALSL) — **July 1992 to December 1995**

CERTIFIED INDUSTRIAL HYGIENIST, DIRECTOR- INDUSTRIAL HYGIENE LAB SERVICES, SENIOR ENVIRONMENTAL CHEMIST

Mr. Pfromm provided a variety of industrial hygiene and indoor air quality services to a broad range of clientele, from consulting engineers to school districts (ALSL). In addition, Mr. Pfromm served as Organics Section Group Leader for the laboratory (ALSL). At Analytical Hydrology Associates (AHA), Mr. Pfromm was Laboratory Manager and Senior Environmental Chemist responsible for all laboratory operations, training of other chemists and report preparation and review.

TRACOR INSTRUMENTS, INC — **October 1988 to January 1990**

SENIOR MARKETING REPRESENTATIVE

Mr. Pfromm provided sales and technical training to clientele of this analytical instrument manufacturer in a variety of environmental and industrial hygiene services to a broad range of clientele, from consulting engineers and laboratories to municipal water treatment authorities. In addition, Mr. Pfromm received the companies' "Presidents Award" for second highest national sales and third highest worldwide sales in 1989.

ROBERT A. PFROMM, CIH

SENIOR TECHNICAL ADVISOR

SPOTTS, STEVENS & MCCOY, INC. (SSM) **June 1981 to October 1988**

INDUSTRIAL HYGIENIST, SENIOR ENVIRONMENTAL CHEMIST, CERTIFIED INDUSTRIAL HYGIENIST (1988)

Mr. Pfromm served as Organics Section Group Analyst for the Industrial Hygiene laboratory and later as Group Leader. Mr. Pfromm also provided a variety of industrial hygiene and indoor air quality services to a broad range of clientele, from consulting engineers to school districts. The broad range of projects SSM was involved in as a consulting engineering firm, exposed Mr. Pfromm to a rich level of industrial hygiene and environmental experience which has proven to be extremely valuable in his later endeavors.

EXPERIENCE HIGHLIGHTS

Since 1988, Mr. Pfromm has had many experiences working on sick building syndrome/indoor air and water quality projects. He has been the project manager on HVAC remediation projects for clients and investigated numerous complaints of illness from indoor airborne/microbial contaminants.

A partial list of Indoor Air Quality and Industrial Hygiene projects that Mr. Pfromm has been directly involved with as either a Project Manager or Lead Investigator follows:

- Chester County Courthouse Annex – fungi contamination.
- Little Egg Harbor School District, N.J. – fungi contamination, roof leak.
- Upper Deerfield School District, N.J. – excessive humidity and fungi contamination .
- Upper Saddle River School District, N.J. – fungi contamination.
- Woodridge School District, N.J. – fungi contamination.
- Pennsylvania State Senate Chamber – post remediation fungi clearance sampling.
- Lafayette College, Easton, PA. – fungi sampling in Library following elevated humidity condition.
- Waynesboro Hospital, PA. – investigation of foul odor, fungi and bacteria contamination .
- York Hospital, York, PA. – pre and post remediation fungi sampling in hospital wing.
- a leading surgical instrument manufacturer, Reading, PA. – plant wide survey for trace levels of sulfuric acid vapors, which were causing an etching problem.

- Diversified Mechanical Incorporated, PA. – Carbon Monoxide survey in warehouse of DMI client.
- DMI, PA. – Carbon Monoxide survey in an eastern PA. High school.
- Excelsior Blower Corp. PA. – Welding Fume survey in plant to determine effectiveness of improvements to ventilation system.

LITIGATION SUPPORT AND EXPERT TESTIMONY

Mr. Pfromm has performed many projects over the past twenty (20) years that involved epidemiological investigations, environmental health investigations, indoor air quality (IAQ) and indoor environmental quality (IEQ). Most recently, while at A2SI, Mr. Pfromm managed a comprehensive long-term IAQ/IEQ project for major Pennsylvania State agency that involved extensive health investigation studies, surveys, testing, public relations, and expert testimony. Due to our commitment to client confidentiality, we cannot discuss the details of such survey. However, the following reference is given to verify the work performed for that agency:

Pennsylvania Office of Administration
Mr. William Trusky
Manager, Accelerated Grievance Program
Bureau of Labor Relations
Room 404 – Finance Building
Harrisburg, Pennsylvania 17120
Telephone: 717-783-5160

In addition, Mr. Pfromm has been qualified to provide expert testimony on many occasions, most notably as follows:

- 1985 – expert witness court testimony in a gasoline spill incident;
- 1990 – expert witness court testimony in a case against a laboratory regarding laboratory operations and analytical testing procedures;
- 2001 – expert testimony involving indoor air quality, indoor environmental quality, health related issues, in a project with a major Pennsylvania State agency;
- 2002 – expert testimony in an Alabama case regarding indoor air quality and indoor environmental quality, health related effects, and source identification.

ROBERT A. PFROMM, CIH

SENIOR TECHNICAL ADVISOR

EDUCATION AND CREDENTIALS

Kutztown University
B.S. Environmental Science, 1981
B.A. Marine Science, 1979

Certified Industrial Hygienist (CIH)
American Board of Industrial Hygiene (ABIH), 1988
Certificate #3948

Indoor Environmental Quality (Sub-specialty)
American Board of Industrial Hygiene (ABIH), 1999

ADDITIONAL TRAINING

Kutztown University – "Noise and Man - Industrial Noise and Hearing Conservation" – 1981

University of Michigan - "Guidelines for the Assessment of Bioaerosols in the Indoor Environment" – 1989

Harvard University – Harvard School of Public Health – "Indoor Air Quality – Evaluation, Measurement and Control" - 1992

American Industrial Hygiene Conference (AIHC) – Professional Development Course (PDC) – "Indoor Air Quality and HVAC Systems" - 1995

AIHC – PDC – "Guidelines for the Determination, Remediation and Prevention of Biological Contamination in Indoor Environments" – 1998 & 2001

MidAtlantic Environmental Hygiene Resource Center –"Controlling Moisture and Microbial Problems in Buildings" - 1999

PROFESSIONAL AFFILIATIONS

Member, American Industrial Hygiene Association
Member, American Board of Industrial Hygiene

ROBERT A. PFROMM, CIH
SENIOR TECHNICAL ADVISOR

PUBLIC SERVICE

- President, Bernville Borough Council (Municipal Government), Bernville, PA
- Chairman, Water, Sewer and Public Safety Committee, Bernville Borough Council
- Member, Budget Committee, Bernville Borough Council
- Chairman, Emergency Services Committee, Bernville Borough Council

Exhibit 2

A2SI
ADVANCED APPLIED SCIENCES, INC.

September 12, 2002

Mr. Jack P. & Karen A. Marrone
11673 Highway PP
Dixon, Missouri 64559

RE: Consultative Services - A2SI Project No. 2134
Litigation Support of Civil Action No. 1: CV-01-0073
SUBJECT PROJECT:
Marrone Residence
354 Timber Road, (Mt. Gretna)
Lebanon, Pennsylvania
Addendum to A2SI Project # 2008116
(Original Report Date 10/15/2000)

Dear Mr. & Mrs. Marrone:

At the request of you and your attorney, Gianni Floro of Tarasi, Tarasi & Fishman, a review of A2SI's earlier project report **#2008116** was performed. As an additional support, we reviewed some additional pictures taken in the residence at 354 Timber Road by Mr. Floro, sometime after our original visit on 8/28/2000. In the pictures, more of the basement foundation wall finish (paneling, fiberglass insulation, and black roofing paper) and the ceiling drywall had been removed. These pictures helped to confirm our opinions stated in the original report that the exterior wall treatment was a significant contributor to the moisture and humidity levels in the basement which allowed the fungal growth we identified to grow and multiply.

At the time of our original visit, only a limited amount of wall and ceiling covering had been removed. The more recent pictures show additional discoloration from moisture, of the cement block foundation walls throughout the basement, and possibly from some fungal growth (as was found in sample 82800-002 in the earlier report), as well.

COMMENTS

During the many IAQ/IEQ (indoor Air Quality/ Indoor Environmental Quality) surveys and assessments we have performed, we have observed a significant number of basements which had been finished in conventional ways, but should not have been finished due to a variety of limiting factors (circumstances and conditions). These limiting factors range from terrain and topography issues, to foundation type (cement block as opposed to a poured cement foundation), to the condition of the foundation, to

the presence of ongoing leaks or seepage (indicated by efflorescence and staining), to preexisting mold indications, to indications of elevated interior humidity from additional sources such as unvented hot tubs and combinations of these previously mentioned factors. If a home has one or more of these factors, there is a good possibility of moisture problems occurring in this basement, if inappropriate wall finishing methods are used significant mold growth can also become an issue. Based on our assessment, the residence at 354 Timber Road, had all of the limiting factors mentioned above.

CONCLUSIONS

Moisture that passes through the wall must be allowed to evaporate and be exhausted from the area by normal air exchange, or be removed by dehumidification. Sealing the wall surface by placing a "vapor barrier" or vapor retardant such as black roofing paper against the foundation surface will prevent normal evaporation of water passing through the foundation, so this moisture will build up behind the "vapor barrier" until it begins leak out the bottom of the wall (usually dampening the carpet pad and carpet, if present, which will usually result in mold growth in the carpet, as was also found here) or through seams in the vapor retardant. Excessive amounts of moisture behind this type of vapor retardant (many seams = leak points) will result in elevated humidity levels in the wall cavity and mold growth in the wall cavity. Another moisture source in a wall cavity of this type, is moisture from the humid basement (**hot tub**, leaking plumbing, humid air coming in from outside) permeating through the paneling, through the insulation and reaching the cool surface of the vapor barrier covered foundation. This moisture is likely to condense and dampen the foundation wall surface and maintain the humidity of the wall cavity and to a lesser degree the wall covering (paneling) to allow mold growth to continue. So, if adequate rain has occurred for ground water to lie against the foundation and to penetrate foundation wall, the moisture will collect in the wall cavity. If rain has not occurred for while but humidity levels are high, the cooler surface of the foundation will still condense moisture which will collect in the wall cavity. Either situation results in moisture which will collect in the wall cavity and produce potential mold growth.

With a reasonable degree of scientific certainty, based on our experience and training, the mold growth in the Marrone residence at 354 Timber Road was a result of the elevated moisture levels in the basement and in the basement wall cavities. These moisture levels were the result of the contributing factors detailed in the COMMENTS section, but primarily were the result of the inappropriately constructed finishing walls of the interior of the foundation trapping moisture that under other circumstances would have simply evaporated away.

RECOMMENDATIONS

For a basement such as this to be finished, an exterior drainage system and modifications to the landscaping would be suggested parts of the corrective actions required. The simplest but least attractive finishing approach would be to simply paint the foundation block walls with a waterproofing paint and operate a dehumidifier in the basement. A more cosmetic interior treatment would be to put wood studs and insulation up with a tight vapor barrier such as plastic sheeting, on the interior side (towards the room) of the insulation. However, with the amount of moisture potentially passing through the foundation, there is a high probability that moisture levels would still be elevated in the wall cavities, the carpets could still become damp and mold could still grow both in the wall cavities and in the carpet. Operation of one or more dehumidifiers in this basement would improve the situation by reducing the moisture levels present. A third option which we have seen have success in this type of situation is to build the finishing wall several inches from the foundation wall to provide an air space. This space is then ventilated by a small exhaust fan (more than one may be needed) which draws the damp air out of the space and vents it from the house. A further modification would have a dehumidifier in an adjacent area to the wall cavity (utility room or closet) and vent the dehumidified air into the wall cavity to further reduce the humidity level in the wall. A second dehumidifier drying the basement room air would further improve the conditions by reducing vapor loading, humidity levels and consequently, the potential for condensation.

ADDITIONAL INFORMATION

Mr. Pfromm has been qualified as an expert on several occasions, as follows:

- 1985 – expert witness court testimony in a gasoline spill incident;
- 1990 – expert witness court testimony in a case against a laboratory regarding laboratory operations and analytical testing procedures;
- 2001 – expert testimony (deposition) involving indoor air quality, indoor environmental quality, health related issues, in a project with a major Pennsylvania State agency
- 2002 – expert testimony (deposition) in an Alabama case regarding indoor air quality and indoor environmental quality, health related effects, and source identification.

References

Bioaerosols – Assessment and Control, published by the ACGIH (American Council of Governmental Industrial Hygienists) 1999

Guidelines for the Determination, Remediation and Prevention of Biological Contamination in Indoor Environments, Professional Development Course (#704) AIHA (American Industrial Hygiene Association) and the ACGIH, 1999 AIH Conference and Exposition

Controlling Moisture and Microbial Problems in Buildings, Professional Development Course, 1999 Mid Atlantic Environmental Hygiene Resource Center

Remediation and Prevention of Biological Contamination in Indoor Environments, Professional Development Course (#706) AIHA (American Industrial Hygiene Association) and the ACGIH, 2001 AIH Conference and Exposition

A2SI was pleased to assist you with this investigation and thank you for the opportunity to submit this Addendum to our previous project..

Sincerely,

Robert A. Pfromm

Robert A. Pfromm, CIH
Senior Technical Advisor

Enclosures

ADVANCED APPLIED SCIENCES, INC.

October 15, 2000
FINAL REPORT

Jack and Karen Marrone
354 Timber Road, Mt. Gretna
Lebanon, PA 17042

Project: IAQ Survey of the Marrone residence – 354 Timber Road, Mt. Gretna
A2SI Project # 2008116

Dear Mr. & Mrs. Marrone:

A2SI was requested by the Marrone's to perform a limited Indoor Air Quality/Indoor Environmental Quality (IAQ/IEQ) survey on 8/28/2000 to determine possible Bioaerosol (airborne Fungi, Mold and Yeast) involvement in Indoor Environmental Quality complaints related to the residence.

Executive Summary

The Marrone's have related that the home at 354 Timber Road, Mt. Gretna, was originally shown to them during a period of dryer weather. At that time, they did not observe any signs of water problems or visible mold. It was also stated, that as the weather changed and became damper, they began to notice more and more indicators of potential water problems (dampness in the basement, musty odors and eventually significant visible mold on the paneling and other surfaces). There were also some plumbing problems in the basement that became evident. These problems were indicated by numerous spots on the basement ceiling, where condensation from the pipes was wetting through the drywall ceiling and black spots leaching through at many of these points where mold was possibly growing (a common indicator of mold growth on the top surface of a ceiling). Visible mold became a significant noticeable problem in the basement and the Marrone's became concerned enough to request an IAQ/IEQ evaluation. Several members of the Marrone family were having indications of respiratory distress. Testing was performed as noted in the Scope of Work section, using appropriate methodologies and samples were sent to a qualified laboratory for incubation and identification. Several recommendations were made at the time of sampling based on the observed conditions. Evaluation of the results and observations led to the following conclusions:

Air, surface and carpet dust samples, all indicated the presence of fungi unrelated to the outside air, either by species or number, including the fungi Aspergillus, Penicillium and Stachybotrys, which are known and significant allergens. Heavy visible surface growth, all in the basement, was noted and sampled. The sampled surface locations were as follows: two separate walls in the basement (which appeared to have a coating of a faintly gray/green mold. Several other surfaces

CORPORATE HEADQUARTERS
4400 LINGLESTOWN ROAD ◆ HARRISBURG, PA. 17112
TELEPHONE: (717) 651-9377
FAX: (717) 657-0752

had visible indications of mold, but were not sampled as representative surfaces of similar mold had already been sampled. Air samples were as follows: basement air, living room air, and outside the home for control and comparison purposes. Carpet dust was sampled in the basement and the living room. The basement was also found to have high Relative Humidity percentages (RH%) and a measurably higher airborne moisture loading (absolute humidity) than the outside air. The first floor RH% measured in the living room was within ASHRAE guidelines. The basement was found to have significant quantities of surface growth of known allergens and with the elevated interior humidity, additional growth would be possible, potentially resulting in a release of spores and fungal fragments (a "bloom" or amplification), which could challenge the respiratory conditions of the occupants. The cement block foundation interior walls are, in most of the basement covered with "tar paper" followed by fiberglass insulation and finished by wood fiber paneling. When a portion of the "tar paper" was peeled away by the homeowner, the foundation wall and the wall surface side of the "tar paper", were visibly wet.

Observations

The home has a mostly finished basement, with a cement floor and a cement block foundation. The house is built on rolling terrain, with landscaping in relatively close proximity. The ground around the home appeared quite damp. A2SI was contacted because of the presence of visible mold on a number of interior surfaces of the home, especially the basement, and the homeowners concern for potential health effects until these contaminants are identified. Bioaerosol samples were collected on each floor, with an emphasis on the basement, where most of the visible mold was noticed, and surface samples and carpet dust were also sampled at specific locations. An outside bioaerosol sample was collected for comparison and control purposes, as required by the methodology. In addition to the observations noted in the Executive Summary above, the basement of the house had a noticeably musty odor, with visible mold on many of the observed surfaces. There were also a number of visible wet spots in the basement, primarily on the walls. It was observed, that the most of the interior surface of the below grade (underground) foundation walls were covered first with a layer of tar paper, then with fiberglass insulation between studs, then with the wood paneling. This does not prevent moisture from entering the basement. What this type of wall treatment does do is slow evaporation preventing the walls from drying, allowing excessive mold growth behind the walls and by letting the moisture into the basement, increases the relative humidity throughout the basement making mold growth possible almost anywhere in the basement.

Scope of Work

A series of samples were collected in the residence located at 354 Timber Road, Mt. Gretna. The purpose of this sampling was to characterize the potential biological contamination in the home following the finding of visible mold inside the home. The samples were collected at several locations throughout the home. Sampling types consisted of airborne biological contaminants (Bioaerosols), collected with an Andersen N6 impaction sampler and Sabouraud's Dextrose Agar (fungal samples). Surface samples were collected with sterile biological transfer swabs. Two carpet dust samples was collected from a 1 square foot area, using 25 mm filter cassettes with 0.45 micron pore size membrane filter and a high volume air pump. Air sampling locations

included the basement, the first floor living room, and an outside sample for comparison and control. Surface samples were all collected in the basement, from suspected visible mold, and carpet dust was collected from the carpet in the basement and in the living room. Actual fungal ID's and counts were detailed in the lab report (Attached Appendix A).

This indoor air quality survey was performed within the scope of work and in accordance with chosen professional standards and guidelines, and in accordance with known applicable regulatory requirements and guidelines. The sample collection, laboratory analyses, data reduction and calculations, interpretations, and evaluations were performed accurately to the best knowledge of A2SI. A2SI assumes no liability for financial or health consequences from the actions or lack of actions taken by the Marrone family, or others, as a result of this report. All collected data, observations, conclusions, and recommendations presented in this report were influenced by the conditions which existed at the time of the survey and sample collection, and are representative of those conditions existing at the time of sampling and in the location sampled.

Sample Locations

Sample ID Number	Sample Type	Location
82800-001	Surface swab – Mold and Fungi	Wall in basement
82800-002	Surface swab – Mold and Fungi	Wall in basement
82800-003	Air Sample - Mold and Fungi	Basement air
82800-004	Carpet dust – Mold and Fungi	Carpet dust in Basement
82800-005	Air Sample - Mold and Fungi	Living room air
82800-006	Carpet dust – Mold and Fungi	Carpet dust in Living room
82800-007	Air Sample - Mold and Fungi	Outside air

Sample Results Summary

Sample ID Number & Type		Total Fungi – CFU/unit
82800-001	Surface swab –	>336 CFU/in^2
82800-002	Surface swab –	322 CFU/in^2
82800-003	Air Sample –	4308 CFU/m^3
82800-004	Carpet dust –	>4390 CFU/ in^2
82800-005	Air Sample –	228 CFU/m^3
82800-006	Carpet dust –	1321 CFU/ in^2
82800-007	Air Sample -	588 CFU/m^3

CFU/in^2 - Colony Forming Units/square inch; CFU/m^3 - Colony Forming Units/cubic meter
Detailed Bacteria and Fungi results are found in Appendix 1

Relative Humidity and Temperature Results

Location	Relative Humidity (RH%)	Temperature (°F)
Outside House	50 %	79
Living room	52%	75
Basement	71%	70

Results

The outside bioaerosol counts should, in general, always be higher than the inside counts. This situation will occur, if there is a normally functioning ventilation system and if other circumstances effecting bioaerosol growth are in an acceptable range. An acceptable range of circumstances would minimize fungi and bacteria growth – such as clean and dry conditions; an unacceptable range of circumstances would help to maximize fungi and bacteria growth – such as dirty and damp or wet conditions.

If windows are open for ventilation, and air exchange is occurring, the counts should be approximately the same, but generally no higher inside than outside and the genera and proportions should be similar. If there is a situation leading to interior amplification of bioaerosol numbers, it should be readily apparent from the counts and proportion comparisons of the different genera of organisms. If the only source of fungal contamination was the outside air, then proportions of fungi in all of the samples inside or out would be comparatively similar. The proportions were determined to be significantly different during this sampling.

The presence of an organism in an interior sample and not in the exterior sample requires either active growing colonies of the organism or a reservoir of viable spores to be present in the building. For this apparent amplification to be possible, several requirements must be met or have been met at some time in the recent past. They are as follows: a substrate or growth media, appropriate temperature conditions, and adequate or excessive moisture. Normal dust and dirt are generally adequate to serve as a minimal growth media, but carpeting and the dirt it traps is even more favorable for growth. Virtually any surface in a home has an adequate source of nutrients for fungal growth to begin and occasionally the fungi can colonize the substrate (such as paneling). Over time the available nutrients on surfaces tend to increase through deposition such as cooking oils which became volatile when heated, or from application, such as cleaning agents. It is well documented that virtually any surface will have adequate nutrition for fungi to begin growing. Relative humidity percentages of greater than 60% are adequate for some fungal growth to begin, but higher humidity makes it more likely, and damp or wet surfaces will be ideal for growth. The RH% values make it clear, that at the time of sampling, the interior of the basement of the house was more humid than the outside air. This helps to create an ideal condition for mold and fungi growth.

The living room air sample (005) was lower in total counts then the outside sample, and the species present and the proportions of different fungi were similar to the outside sample for 2 out

of 3 organisms. The additional fungi is present in the basement in elevated numbers, and the quantities found in the living room for this fungi could easily be explained by normal air movement in the house, even with the basement door closed. The basement air sample (003) was much higher in total counts then the outside sample (007), and the species present and the proportions of different fungi were also significantly different from the outside sample indicating the presence of single or multiple repositories of growth and/or amplification points. This conclusion was supported by the readily visible fungal growth found in the basement and the laboratory results, which confirmed this as well.

The carpet samples in both the living room (006) and the basement (004), indicate contamination by a variety of fungi. However, the basement carpet represents a potential respiratory hazard. The living room carpet results, while indicative of contamination, appear to be controllable by HEPA vacuuming and aggressive carpet cleaning, disinfection and rapid drying. Every effort should be made to control excess moisture in this home. As noted above, the basement carpet is significantly contaminated and is very possibly the primary source contributing to the high air counts found for both Aspergillus and Penicillium. As we recommended during our sampling visit, this carpet should be disposed of. The living room carpet is by itself unlikely to produce substantial airborne bioaerosols unless it is aggressively disturbed as with vacuuming using a non-HEPA filtered vacuum, or if the carpet was allowed to become damp or wet for an extended period. This could occur if the carpet was cleaned and not quickly and thoroughly dried. As we recommended during our sampling visit, only a HEPA filtered vacuum should be used in a carpeted home or area with allergens present and allergy sufferers in residence.

No bioremedial efforts will be successful if the moisture levels remain elevated. Even though the living room air samples have lower total fungal counts than the outside sample, there are a number of species of concern from an IAQ and allergen perspective. The living room air sample (005) contained mostly Cladosporium, which is considered a fairly mild allergen and is the predominant fungi in the outside sample. This sample also contained a low number of Aspergillus sp., a genus with generally stronger allergen effects and a similar count of Penicillium sp., generally considered somewhat less allergenic than the Aspergillus sp. and also in low numbers. The basement air sample (003) had a much higher count than the outside sample and more significantly, the predominant fungi was Penicillium sp., not Cladosporium sp. as in the outside sample, indicating a significant reservoir of Penicillium in the basement. In fact, the basement sample did not have any detectable Cladosporium sp., but the presence of any Cladosporium may have been masked by the other growth. The remainder of fungi in the basement air sample was Aspergillus sp., also in significantly high but somewhat lower numbers than the Penicillium.

A swab sample (001) was collected from the basement wall paneling on the outside of the bathroom (not an exterior wall, adjacent to the foundation, but an interior wall). This sample was collected due to the possible appearance of fungi growth on that surface. This surface coating was a dusting, of light gray to green in color. The lab results indicate a significant presence of Stachybotrys sp. fungi spores on that surface. The fungi growth observed on the wall surface did not have the characteristic appearance of Stachybotrys (black and moist) and the paneling did not appear to be at the time of the sampling or to ever have been wet to the extent normally

associated with Stachybotrys. The paneling in this area was dry and unstained. The second swab sample collected in the basement (002) was sampled from the wet foundation wall, after lifting up a section of the tar paper that presently covers most of the below grade interior wall surface. This sample had a very similar proportion of Stachybotrys and Aspergillus to the other wall sample. This sample also had one additional fungi (Mucor sp.), which prefers wet conditions.

Conclusions

There were noteworthy indications of fungal contamination in this house. The fungi found are of significant concern from an allergen aspect, dependant on the sensitivity of the exposed person. These levels could possibly be at symptomatic concentrations, if the exposed person is, in fact, sensitive to these species. As noted above, conditions are adequate for additional growth to occur, with the elevated RH% and the existing surface growth, which could substantially increase the exposure risk for a susceptible individual, such as an asthmatic. Appropriate medical testing on the occupants by qualified medical personnel could assist in determining the susceptibility of these individuals. Based on the observed and confirmed surface growth of Aspergillus and Penicillium (carpet) in this home, and the non-typical presence of Stachybotrys, it would be prudent to limit occupancy by individuals known to have a physical condition aggravated by fungal contamination. At least until corrective actions have been completed and the effectiveness of these actions confirmed by follow-up testing.

Some fungi of the genus Aspergillus are opportunistic pathogens in susceptible immuno-suppressed individuals (HIV or AIDS patients, organ transplant patients, chemotherapy patients and diabetics are some examples of these). The levels of contamination found in this residence should be controlled with aggressive means to prevent any increases, reduce the existing populations and return the interior populations to the ideal of a reduced version of the exterior populations. The amount of surface fungi present could under existing conditions of growth produce a substantial airborne allergen count in this home, especially as the season requires that the windows be closed, thus reducing the air exchange of this house. So far, based on the sampling, there does not appear to be an excessive transfer of allergens to the first floor from the basement. As noted in the air samples, despite the presence of Stachybotrys in the basement, there was none detected in the basement air sample. Stachybotrys is usually not detected in air samples due to the normal state of the spores (wet and sticky).

It is obvious from the inspection observations and the lab results that this home and specifically the basement were at the time of sampling significantly damp and contaminated with a variety of allergenic fungi. The susceptibility of the occupants to these allergens and the quantities present are the deciding factors in how the occupants will react to this exposure.

It is essential that the moisture problems with the basement foundation be corrected and that steps be taken to reduce relative humidity levels in the basement and in the main portion of the house. Based on observations, the carpet in the living room is also a very likely source reservoir of some of the airborne concentrations. Controlling moisture is the primary method of controlling mold, fungi and bacteria in a residence. Additional aggressive cleaning (with HEPA vacuums) and disinfection may be needed.

Recommendations

1.) Until the presence of the elevated fungal growth, specifically Stachybotrys and Aspergillus sp., is reduced or removed, occupation of the basement of this home would generally not be recommended.

2.) Until other steps can be taken, we strongly recommend that all vacuuming of carpets and furnishings done in this home, only be done with a true HEPA filtered vacuum cleaner.

3.) Install a dehumidifier (more than one if necessary) in the basement permanently and operate a unit in the main occupied area of the house when humidity is high.

4.) Portable HEPA filtration units can be used in occupied rooms to further reduce airborne allergens of all types, if needed.

5.) Redirect all downspouts so that flow of rain water from the gutters does not directly contact the side of the foundation or saturate the ground directly adjacent to the house. This recommendation also applies to the sump pump discharge.

6.) Sample additional locations in the basement to localize contamination sources there and to determine extent of remediation or precautions required for use and occupancy.

7.) Evaluate additional waterproofing methods for the foundation (exterior or interior methods), many options are available.

8.) It may be of value to have the entire house "fogged" with a biocidal disinfectant (several types are available) to eliminate viable free floating fungal spores, and to eliminate surface contamination on walls and hard surfaces. This process would not eliminate contamination from carpets or furnishings, as spores may be deep into the pile or fabric. Fogging will also not control the growth of fungi behind the "tar paper" water proofing in the basement. Further bioremediation suggestions are possible. The use of Ozone treatment systems is generally not recommended to control fungi and bacteria due to inconsistency of treatment, inability of the Ozone to penetrate porous materials, questionable effectiveness under different circumstances and the known toxicity of Ozone (OSHA limit of 0.1 ppm). The EPA has a great deal of information on this application and does not recommend it.

9.) The basement "waterproofing" should all be removed and the walls disinfected. More effective true waterproofing methods should be implemented to dry the basement. These methods may include any of the following: foundation exterior application of waterproofing agents with drainage tile; interior drainage of the block wall with interior application of a waterproofing material; in either case, dehumidification will be necessary.

These recommendations may not be in order of urgency, as we feel all may be necessary to complete the control of the contamination in this residence. We would be pleased to discuss these recommendations further. If you have any questions in reference to this report, please contact us at your earliest convenience.

Sincerely,

Robert A. Pfromm, CIH
Project Manager
Advanced Applied Sciences, Inc.

APPENDIX 1

A2SI
ADVANCED APPLIED SCIENCES, INC.

LABORATORY REPORT

CLIENT PROJECT INFORMATION

Client Name:	Marrone	**Project Manager:**	Robert Pfromm, CIH
Address:		**Project ID:**	2008116
		Project Number:	
		Telephone:	
		Fax:	

LABORATORY PROJECT INFORMATION

Project Number:	2008106	**Date Received:**	8/28/00
Project Manager:	Robert J. Lesher, Ph.D.	**Due Date:**	NA
Quote Number:	NA	**Date Completed:**	9/10/00
Invoice Number:	NA		

LABORATORY RESULTS

FIELD SAMPLE ID	Sample Type	LOCATION DESCRIPTION	RESULT	ISOLATE	UNITS
82800-001	Wipe, 1sq. in.	Basement Wall 1		Fungal Isolates	CFU/in^2
			>300	Stachybotrys sp.	
			36	Aspergillus sp.	
82800-002	Wipe	Basement Wall 2		Fungal Isolates	CFU/in^2
			276	Stachybotrys sp.	
			40	Aspergillus sp.	
			6	Mucor sp.	
82800-003	Air, 85 liters	Basement		Fungal Isolates	CFU/m^3
			3192	Penicillium sp.	
			1116	Aspergillus sp.	
82800-004	Vac, 144 sq. in.	Carpet Basement		Fungal Isolates	CFU/in^2
			>3000	Penicillium sp.	
			1300	Aspergillus sp.	
			90	Alternaria sp.	
82800-005	Air	Living Room		Fungal Isolates	CFU/m^3
			180	Cladosporium sp.	
			24	Aspergillus sp.	
			24	Penicillium sp.	

CORPORATE HEADQUARTERS
4400 LINGLESTOWN ROAD ♦ HARRISBURG, PA, 17112
TELEPHONE: (717) 651-9377
FAX: (717) 657-0752

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ADVANCED APPLIED SCIENCES, INC.

LABORATORY RESULTS

FIELD SAMPLE ID	Sample Type	LOCATION DESCRIPTION	RESULT	ISOLATE	UNITS
82800-006	Vac, 144 sq. in.	Carpet, Living Room		Fungal Isolates	CFU/in^2
			920	Penicillium sp.	
			310	Aspergillus sp.	
			60	Chrysosporium sp.	
			31	Epicoccum sp.	
82800-007	Air	Outside		Fungal Isolates	CFU/m^3
			468	Cladosporium sp.	
			60	Epicoccum sp.	
			60	Penicillium sp.	

Laboratory Report Approval

Approved By: _____ Date Approved: 9/15/02

Robert J. Lesher, Ph.D.
Laboratory Director

CORPORATE HEADQUARTERS
4400 LINGLESTOWN ROAD ♦ HARRISBURG, PA. 17112
TELEPHONE: (717) 651-9377
FAX: (717) 657-0752

ADVANCED APPLIED SCIENCES, INC.

Chain-of-Custody Sample Submittal Form

CLIENT: 2008106

Page of

PROJECT: DUE:

LAB QUOTATION #:

CLIENT REPORT TO AND PROJECT INFORMATION				LAB NO:
Company:	A2S I	Project Name:	MARLOWE	Analysis Requested
Contact:	ROB PFROMM	Project No:	2008116	
Address:		P.O. #:		
		Telephone:		
		Fax:		

Turnaround Time: ☑ 5-10 Days ☐ Rush (Specify) _____

Lab ID	Client Sample ID	Sample Matrix: Air	Wipe	Solid	Liquid	Sample Date	Volume (L)	Area (in²)	FUNGI
P2800	-001 BASEMENT WALL 1		✓			8/2/00		1	✓
	-002 BASEMENT WALL 2		✓					1	✓
	-003 BASEMENT AIR	✓					85		✓
	-004 CARPET DUST BASEMENT			✓				144	✓
	-005 LIVING ROOM	✓					85		✓
	-006 CARPET DUST LVRM			✓				144	✓
	-007 OUTSIDE	✓					85		✓

INVOICE TO (may enter "SAME" if same as report)	CLIENT COMMENTS or SPECIAL INSTRUCTIONS
Client:	
Address:	
Phone:	
Fax:	

Sampled By:	Date:	Time:
Robert Pfromm	8/2/00	

Relinquished By:	Date:	Time:	Accepted By:	Date:	Time:
Relinquished To Lab By:	Date:	Time:	Accepted at Lab By:	Date:	Time:
Robert Pfromm	8/2/00		[illegible]	8/28/00	

NOTE: Rush TAT must be pre-arranged. Surcharges will be applied accordingly.

ADVANCED APPLIED SCIENCES, INC.
4400 LINGLESTOWN ROAD ◆ HARRISBURG, PA, 17112
TELEPHONE: (717) 651-9377
FAX: (717) 657-0752